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CLAIMS:

1. A portable electronic device containing an electrochemical cell, said cell having a positive electrode, a negative electrode and an electrolyte, characterised in that at least the positive electrode comprises a mesoporous structure having a periodic arrangement of substantially uniformly sized pores of cross-section of the order of 10^{-8} to 10^{-9} m.

2. A portable electronic device according to any preceding claim, wherein the mesoporous structure of the positive electrode is formed of a material selected from a metal, a metal oxide, a metal hydroxide or a combination of any two or more of these.

3. A portable electronic device according to any preceding claim, wherein the mesoporous structure of the positive electrode comprises a metal and a metal oxide or hydroxide, said metal oxide or hydroxide forming a surface layer over said metal and extending over at least the pore surfaces.

4. A portable electronic device according to any preceding claim, wherein the mesoporous structure of the positive electrode comprises a metal selected from: nickel; alloys of nickel, including alloys with a transition metal, nickel/cobalt alloys and iron/nickel alloys; cobalt; platinum; palladium; and ruthenium.

5. A portable electronic device according to any preceding claim, wherein the mesoporous structure of the positive electrode comprises a metal oxide, hydroxide or oxy-hydroxide selected from: gold oxide; palladium oxide; nickel oxide (NiO); nickel hydroxide ($Ni(OH)_2$), nickel oxy-hydroxide (NiOOH) and ruthenium oxide.

6. A portable electronic device according to any preceding claim, wherein the mesoporous structure has a pore diameter within the range from 1 to 10 nm, preferably from 2.0 to 8.0 nm.

7. A portable electronic device according to any preceding claim, wherein the mesoporous structure has a pore number density of from $4x10^{11}$ to $3x10^{13}$ pores per cm^2, preferably from $1x10^{12}$ to $1x10^{13}$ pores per cm^2.

8. A portable electronic device according to any preceding claim, wherein at least 85 % of the pores in the mesoporous structure have pore diameters to within 30 %, preferably within 10 %, more preferably within 5 %, of the average pore diameter.

9. A portable electronic device according to any preceding claim, wherein the mesoporous structure has a hexagonal arrangement of pores that are continuous through the thickness of the electrode.

10. A portable electronic device according to claim 9, wherein the hexagonal arrangement of pores has a pore periodicity of in the range from 5 to 9 nm.

11. A portable electronic device according to any preceding claim, wherein the negative electrode comprises a mesoporous structure having a periodic arrangement of substantially uniformly sized pores of cross-section of the order of 10^{-8} to 10^{-9} m.

12. A portable electronic device according to any preceding claim, wherein the mesoporous structure is a film having a thickness in the range from 0.5 to 5 micrometers.

13. A portable electronic device according to any preceding claim, wherein the negative electrode comprises a material selected from: carbon; cadmium; iron; a palladium/nickel alloy; an iron/titanium alloy; palladium; and the mixed metal hydride $LaNi_5H_x$.

14. A portable electronic device according to any preceding claim, wherein the negative electrode comprises a material selected from carbon and palladium.

15. A portable electronic device according to any preceding claim, wherein the mesoporous structure of the positive electrode comprises nickel and an oxide, hydroxide or oxy-hydroxide of nickel selected from NiO, $Ni(OH)_2$ and NiOOH, said nickel oxide or hydroxide forming a surface layer over said nickel and extending over at least the pore surfaces, and the negative electrode has a mesoporous structure of carbon or palladium.

16. A portable electronic device according to any preceding claim, wherein the mesoporous structure of the positive electrode comprises nickel and an oxide, hydroxide or oxy-hydroxide of nickel selected from NiO, $Ni(OH)_2$ and NiOOH, said nickel oxide or hydroxide forming a surface layer over said nickel and extending over at least the pore surfaces, and the negative electrode comprises nanoparticulate carbon.

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17. A portable electronic device according to any preceding claim, wherein the cell is constructed to function as a battery, as a supercapacitor or as a combined battery/supercapacitor.